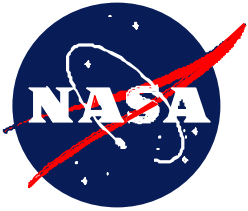# Mission Assurance Guidelines
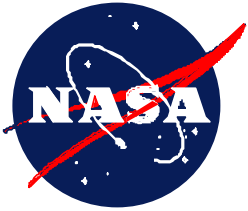
for the

Earth System Science Project

November 15-16, 2001

Agenda

❑ Introduction

❑ Design/Quality Assurance

❑ Systems Review

❑ Risk Mitigation and Mission Readiness

❑ Requirements Verification

❑ Flight and Ground Safety

❑ References

Introduction

❑ Each Earth Explorers project/mission must plan and implement a comprehensive Mission Assurance program.

  ■ It must apply to all flight hardware, software, ground support equipment and mission operations.

  ■ It must include the following systems/processes:

    – design assurance

    – quality assurance

    – systems review

    – requirements verification

   – risk mitigation

    – mission readiness
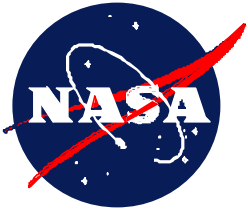
Design Assurance

❑ The project/mission team must plan and implement:

- ■ A parts program that assures mission reliability and performance requirements are met.

- ■ A materials and processes program that addresses materials and fastener selection.

- ■ A reliability program which interacts with all mission disciplines such that design, manufacture and test activities are executed to assure mission success.

- ■ A structured program for software development.
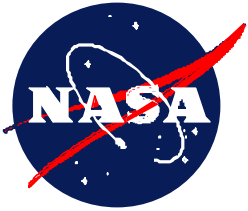
Quality Assurance

❑ The project/mission team must:

- ■ Define and implement a quality system based on ANSI/ASQC Q9001-1994 that meets the intent of ISO 9001.

- ■ Impose workmanship standards which assure mission lifetime and performance requirements are met.

- ■ Define and implement a failure reporting system.
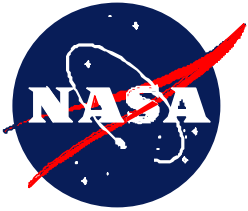
System Reviews

❑ Required reviews for Earth Explorer projects/missions:

- ■ Systems Requirements Review - Recommended

- ■ Preliminary Design Review (PDR)

- ■ Mission Design Review (MDR)

- ■ Confirmation Readiness Review (CRR)

- ■ Critical Design Review (CDR)

- ■ Pre-Environmental Review (PER)

- ■ Pre-Ship/Operational Readiness Review (PSR/ORR)

- ■ Mission Readiness Review (MRR)

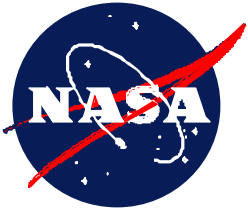- ■ Flight Readiness Review (FRR)
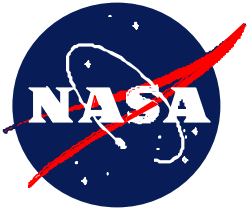
Additional Mission Reviews

❑ Additional Mission Reviews supplement the required reviews and shall be conducted by independent consultants, peers or project/mission team personnel.

■ Peer Reviews - Recommended

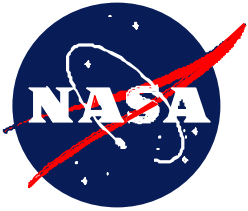■ Red Team Reviews - Required
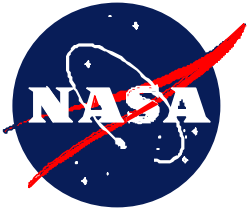
Red Team/Mission Readiness

❑ Red Team and Mission Readiness will be evaluated by GSFC and KSC through reviews.

  ■ Red Team reviews will be implemented as part of the review process beginning at CDR.

  ■ The reviews will enhance the probability of mission success and will cover the following mission elements:

    – Spacecraft and instrument(s)

    – Mission operations

    – Launch vehicle integration

    – Mission-unique items for launch vehicle and mission operations
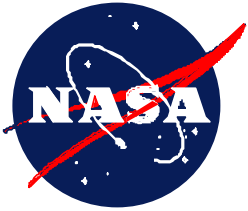
Requirements Verification

❑ Each project/mission team must conduct a verification program to ensure all flight hardware meets the specified mission requirements.

❑ Survival of all expected environments must be simulated by functional demonstration, analysis, physical measurement or test.

  ■ Adequate documentation must be provided, including a verification plan, matrix and procedures.

  ■ Guidelines are contained in the GSFC General Environmental Verification Specification for STS and ELV Payloads, Subsystems and Components (GEVS).

Flight and Ground Safety

❑ Each project/mission team will establish, implement and maintain a system safety program which:

- ■ Identifies and control hazards for personnel, hardware, facilities and equipment.

- ■ Meets safety requirements for the appropriate launch site.

- ■ Meets industrial safety requirements for each team member's institution.

References

❑ Earth Explorers Program Mission Assurance Guidelines & Requirements

❑ Earth Explorers Program Project/Mission Confirmation Plan

❑ Earth Explorers Program Flight & Ground Safety Requirements

❑ All references are available on the Earth Explorers Program library web site:

http://essp.gsfc.nasa.gov/library.html